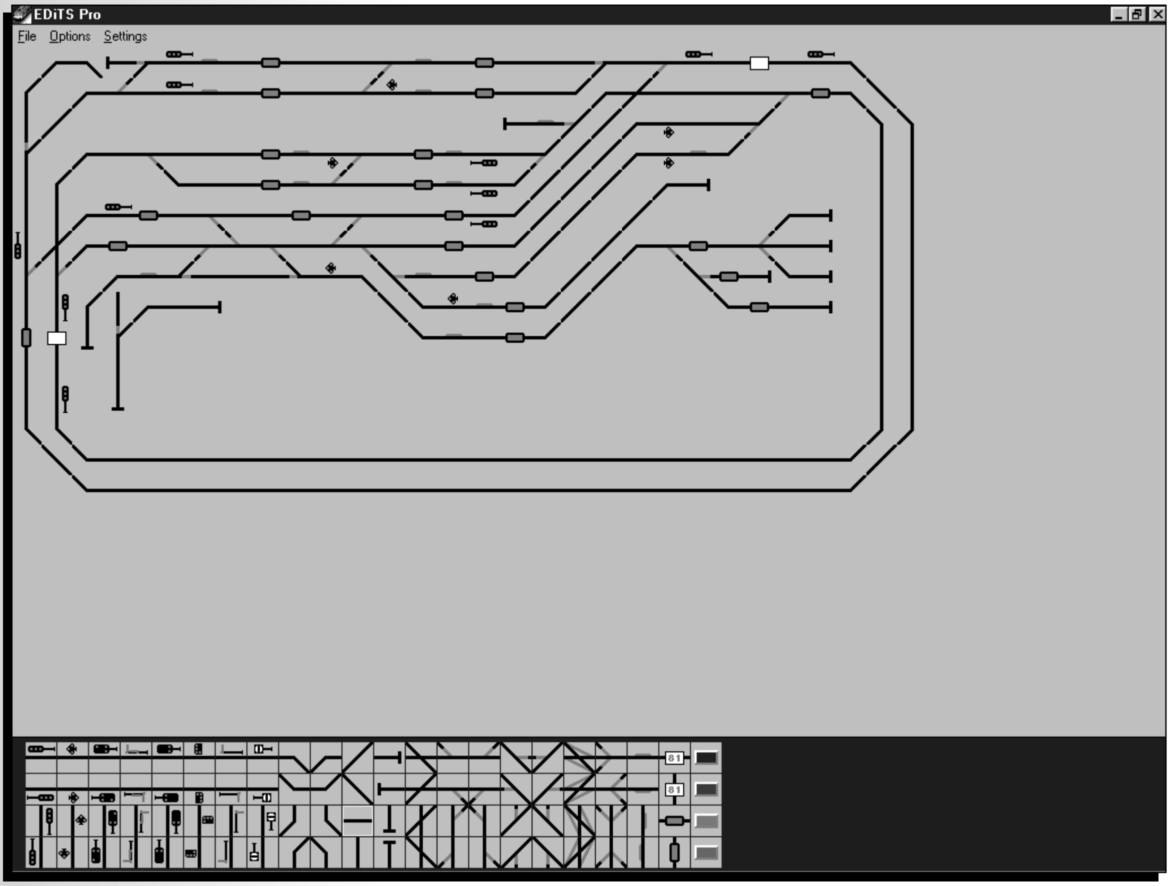
PC-controlled model railway: EEDTS Pro

Part 2: the control software



Although the model railway may be controlled manually, it is more convenient to drive it via a personal computer (PC). For this purpose, a special EEDTS Pro program has been developed for use under Windows. It provides the necessary communication between the controller and the railway track via the PC. This article gives a detailed description of the software. Moreover, elsewhere in this issue there is a project for a booster amplifier suitable for use with the EEDTS Pro model railway.

Design by S van de Vries

INTRODUCTION

Not only is the software, available through our Readers' Services under Order No. 986027, user-friendly, but the designer has also tried to make it give as realistic a picture of a model railway on the monitor screen as possible.

The operator can thus sit facing the screen like a real station master and control the entire track and all that is on it. All functions are available at the click of a mouse.

The program, written in Visual BASIC, is suitable for use with Windows 3.1 or higher, and requires a minimum memory of 8 Mbyte. It is available on diskette in four languages (Dutch, English, French, and German).

GO!

After starting with setup.exe, the installation instructions on the screen guide the operator.

Start the program via the Windows start menu, where the setup program has created its own menu. First, there is a copyright notice on the screen, which disappears automatically after a short time.

After the user has acquainted him/herself with the contents of the text, the text on the screen may be shortened by clicking on the text with the left-hand mouse button. Note, however, that the software can be used only when an EEDTS Pro unit is connected to the system.

The program assumes that the controller is linked to the COM1 port. If this is not so, another communication port may be chosen via the menu 'Settings→Communication'.

LAYING THE TRACK

Once the program is operational, the menu item 'File' may be opened in the usual manner with the mouse. There then appears a sub-menu containing 'New'. 'Load', 'Save', 'Delete', and 'Close'. There is complete control over the saving of screen data.

When 'New' is selected, fresh data may be defined. At the bottom of the screen there is an overview of the railway components familiar to any model railway enthusiast. Any of these may be selected rapidly and efficiently with a click of the mouse. Should a component be placed in the wrong position, this is quickly rectified with the right-hand mouse button. An element may also be moved by clicking on it with the mouse (left-hand button) and dragging it to the wanted position.

In general, the components are divided into four groups: passive, active, return, and detect functions. The return and detect functions, which are found on the screen in the penultimate column, have a fourfold function:

- starting a track
- terminating a track
- placing the starting point of a subsidiary track
- signalling that a track is busy.

The detect button – the white squares in the penultimate column which contain a number (81) – show the number of the train that has passed the relevant point last, provided that the locomotive is fitted with a super engine decoder (see Part 1 – June 1999).

Since detection can take place only in combination with a contact rail, locomotives without a super engine decoder are also detected, but these are indicated by the address ().

USERS

Users are items such as turnouts (points; US: switches) and signals, that are driven by a suitable decoder. There are three types of user:

1 users with one stable condition, such as a uncoupling ramp, and those that are controlled with a yellow or green knob.

2 users that have two stable conditions, such as turnouts or two-way signals, and those that are controlled with a red or blue knob.

3 users that have three stable conditions, such as three-way signals and three-way turnouts.

The coloured knobs in the last column (blue, red, yellow, and green) are not included in the track layout. They may be placed in random positions for special functions, such as switching the station lights on and off via a relevant decoder.

The blue and red knobs function like switches, whereas the yellow and green ones function like push buttons. The latter two are active only when the left-hand button on the mouse is pressed.

All users are controlled via a suitable decoder, which may be EEDTS Pro signals or turnout decoders, or relevant Märklin or Viessmann types. The address of all these decoders is set with a dual in-line package (DIP) IC switch. Each decoder enables up to eight electromagnets to be controlled.

To indicate to the program which user is associated with which symbol on the screen, actuate 'Decoder addresses' via 'Options' and click with the mouse on the relevant symbol.

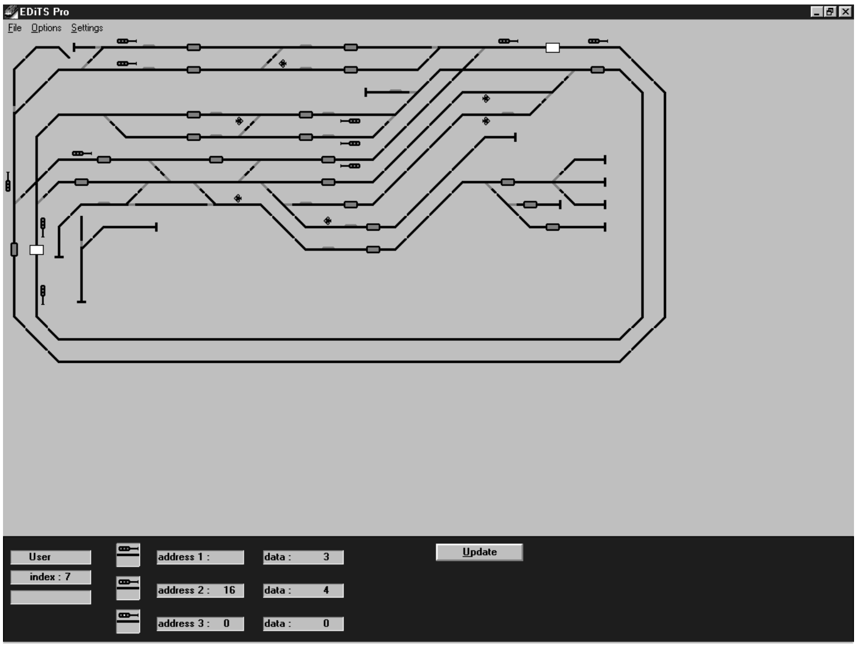
The dark red box shows all states of a symbol and in it may be stated which decoder address and data output are are associated with a particular function.

If only two positions of a three-way signals set are used, the non-used position should be indicated by a 0 decoder address and data output. This converts the three-way signals set into one with two stable conditions. When the 'Update' is actuated, the information is saved.

When all address and data fields are 0, the program assumes that there is no turnout or signal decoder for the symbols.

SIGNALLING

The primary function of the return knobs – grey rectangular symbols – is to signal track occupation. For this purpose, there must be a connection between the relevant symbol and the return signaller. EEDTS Pro and Märklin units may be used together on a track, but do not forget to connect the



User

index : 7

address 1 :

data : 3

address 2 : 16

data : 4

address 3 : 0

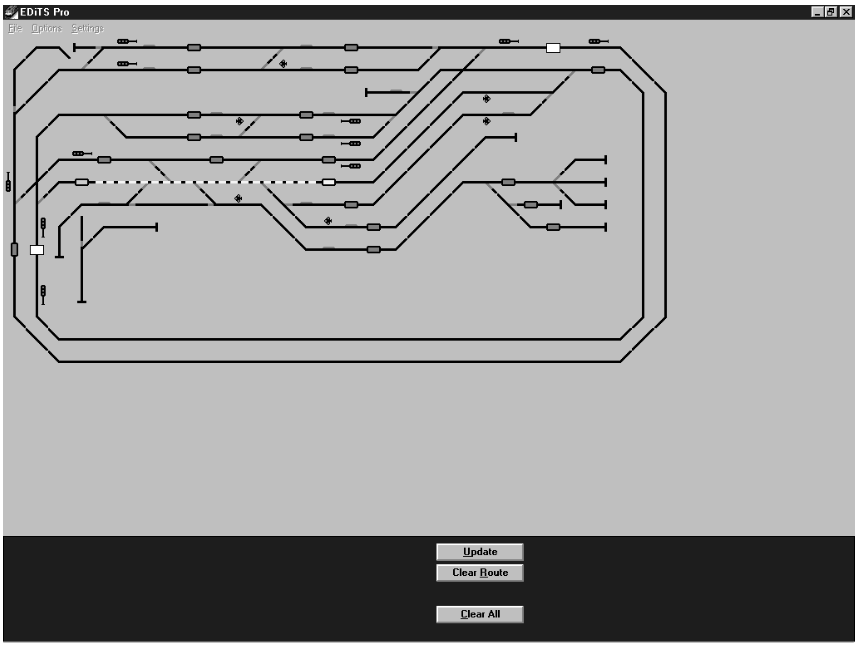
data : 0

sixth wire of the Märklin units (see Part 1 – June 1999).

When the left-hand mouse button is clicked on a return knob, address and data information is needed. The address follows from the sequence in which the decoders are linked to the controller. That nearest to the controller is number one, the next one, number two, and so on. The controller can accommodate up to 32 decoders. If Märklin S88 decoders are used, it must be borne in mind that these use two sequential addresses. Inputs 9–16 are really 1–8 of the next higher address.

TRAIN DETECTION

The train detector module – white rectangular icon –is a detector inserted into a chain of return signallers. After the mouse has been clicked on it, only the address has to be input. More data is not needed, since all eight data bits are used to give the address of the engine decoder.



SECURE TRACKS

Secure tracks are defined as those between two return knobs or between two train detectors. Point the mouse at the return or train detector knob that marks the start of a section of track and press the left-hand button, whereupon the icon should turn green. Then point the mouse at the icon that marks the end of the relevant section of track and press the left-hand button, whereupon the icon should turn yellow. By repeating this process at all intermediate points along a track, a secure section will be defined. This is important because, as will be seen later, the program needs these secure sections of track.

The position of turnouts and signals may be altered by repeatedly clicking with the left-hand button of the mouse on the relevant symbol. If a wrong symbol is selected, this can be corrected with the right-hand button of the mouse.

A secure section of track forms a chain of interlinked symbols, but it remains possible, for instance, for safety reasons, to select a signal outside the section. This signal, which is allowed to show only the ‘stop’ signal, automatically assumes this condition when the relevant secure section is selected.

If a secure section is to be removed, it is selected by clicking with the left-hand mouse button at the start and end of it, and then disabling the individual segments with the aid of the right-hand button. Then, actuate ‘Update’, whereupon the entire section is removed.

When a secure section of track has been saved, it is no longer possible to return to option ‘Build control section’. The only way to alter the track is by erasing all secure sections first.

AUXILIARY PROGRAM

Automatic processing of a train service is possible by an additional module that may be programmed with the aid of mouse movements. The program may institute virtual stations, train service schedules and automatic control of track sections. It also provides protection against lateral or head-on collisions.

The setup of the program is that the train determines its execution. The programming rules are, therefore, coupled to the return or detection knobs that are to be actuated by the train. This often also requires protection with a ‘do not proceed ’ signal. to prevent a train from entering an incompletely arranged section of track or a busy section. The relevant signal set must be placed behind the stretch of detect section associated with the return or detect knob. At rest, it is in the ‘stop’ position. An approaching train has to wait until a section of track becomes accessible to which operation of the signal is coupled. It is useful to position this signal at a reasonable distance from the contact rail used to prevent the train having to wait for the program to be executed.

In the programming mode, return or detect knobs are selected first, after which the associated program lines are composed with the left-hand mouse button. When that button is clicked, the detect knob becomes red and the program screen opens automatically.

Once this is done, a start may be made with defining the action, that is, the selecting of a secure section of track, or setting a user to one of its positions. In case of a secure section, click with the left-hand mouse button on the start of the section – usually the detect knob – and then on the desired end of the section. The red icon then gets a green core and the end stop becomes yellow. The section between these points, which must be saved under option ‘tracks’, then becomes visible.

If a user is to be actuated, click on the relevant symbol with the left-hand mouse button. By clicking on it a few times, it is set to the wanted condition. Any wanted interval preceding the action may also be input.

The next action, for instance, a subsidiary section, may be defined on the next line once ‘Add line’ has been actuated.

There is also a level function: at the first program line, ‘level’ has a value of one. This value is retained until the operator selects a higher one. When the relevant knob is actuated, level is raised by one, whereupon the program lines for this level may be defined. They form a first alternative route.

In ‘Operational’ mode – when the program is executed – the software selects this alternative if the program lines defined at level 1 temporarily cannot be carried out.

The relevant lines are marked non-executable when in one of the lines a section is defined that crosses another one. It may also be that the end of the section is occupied.

The level function thus makes it possible to define a set of alternative routes. This arrangement allows varied traffic at normal stations, and enables virtual stations to be programmed in a simple manner.

If none of the alternatives is possible, no actions are carried out, that is, the train is (temporarily) at standstill. As soon as the situation changes to the extent that one of the alternatives becomes possible, the relevant lines are executed at once.

If no program lines are associated with the selected knob, the lines are shown empty on the screen. Each line carries the 'nx' index number of the relevant button – this nx index number is uniquely allocated by the programmer to a return or detect knob. The number may be called up in menu item 'Decoder addresses'.

A delay in combination with the action 'Secure section' is sensible only if the section is coupled to a signal set contained within the section. When the section is set up with delay, the signal goes to 'stop' to prevent the train continuing on its journey.

Sections that are actuated by program lines become accessible to other traffic when the train has reached the end of the relevant section: a return or detect knob.

To ensure automatic progression of trains, it is advisable to include a program line in each level that sets the signal immediately preceding the program knob to condition 'safe'.

If program lines are associated with a detect knob, it becomes possible to define secure sections that are coupled to a specific engine (loc address). In the case of detect knobs, loc address 0 indicates a locomotive without super engine decoder. The program lines and levels for this locomotive must be programmed first.

When all lines have been input, actuating 'Update' is sufficient to link these lines permanently to the selected knob. If there is an error in the program, the relevant knob must be actuated with the left-hand mouse button. All program lines up to that to be altered are then removed with 'Delete line'. When this is done, reinput the deleted lines and actuate 'Update'.

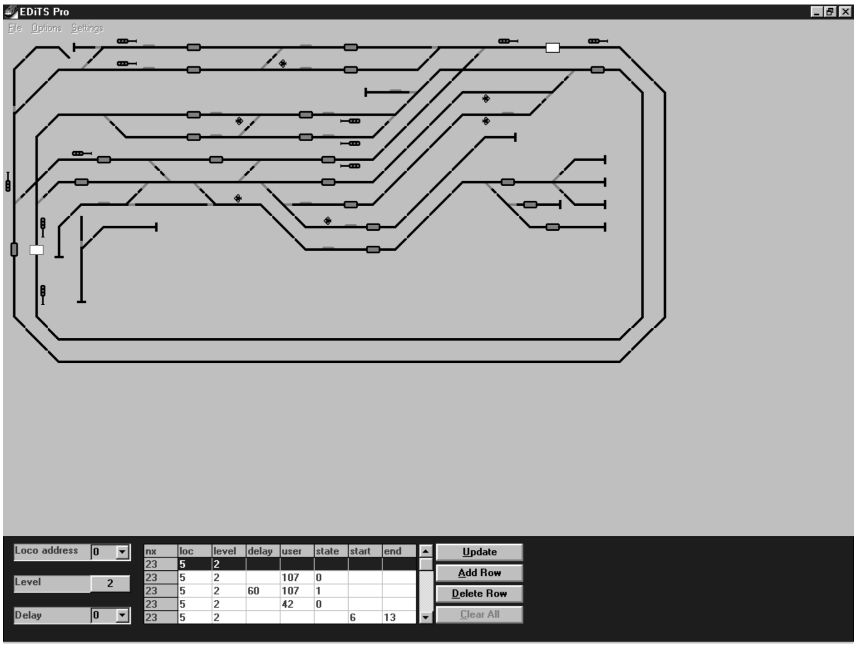
PROGRAMMING THE CONTROLS

A window may be opened via the option 'Soft controls'. Its lower section shows 20 shift controls. There are also four buttons with which a bank of 20 controls may be selected. In total there are, therefore, 80 controls to be defined. When the left-hand mouse button is clicked on the icon with the red arrow present on each control, a configuration screen is opened. The soft controls are used in the operational mode to vary the speed of trains.

Two types of engine decoder may be controlled: normal or extended. Normal refers to standard loc decoders with just one additional functions or decoders without an additional function, such as delta decoders. Extended refers to engine decoders with more – up to four – functions, such as the super engine decoder which is planned for publication in a forthcoming issue of this magazine.

The address of the decoder is input into the address field. A short text must be put into the field 'description' to identify the relevant locomotive.

Next, icons may be placed behind the function keys. Point the mouse at the relevant icon and drag this to the wanted box. When the mouse button is released, the icon is saved in that position. Unused functions must be left empty.



Loco address: 0
Level: 2
Delay: 0

nx	loc	level	delay	user	state	start	end
23	5	2					
23	5	2		107	0		
23	5	2	60	107	1		
23	5	2		42	0		
23	5	2				6	13

OPERATION

When 'Operational' is actuated, trains may be controlled, signals and turnouts set, secure sections of track set up manually or the program may be enabled.

Controlling trains

Clicking on a control – arrow up, arrow down, reverse, or direction function – actuates it. From then on, the icons of the control – as they are input during the programming of the control – can be seen between the 10th and 11th line. The written description of the relevant engine or train can be seen under the buttons.

If all that is needed is setting or resetting of a function, point the mouse at the relevant shift control and click on it with the left-hand button. The speed of the train may be set with the vertical arrows on the control.

If the direction of travel is to be altered, the reverse button must be actuated with the left-hand mouse button. This is, however, possible only when the speed of the engine has been set to 0 with the shift control.

When a super engine decoder or a Märklin decoder with four functions is used, the direction of travel is known. An arrow pointing to the right indicates forward, an arrow to the left indicates reversing.

The functions of an active shift control may be actuated and deactuated with the left-hand mouse button. When the left-hand mouse button is clicked on the relevant icon, the picture changes to indicate that the status has changed.

Shunting

An option that is very useful for shunting trains is the converting from soft control to manual control. This is done by clicking with the right-hand mouse button on the reversing knob of the relevant soft control. The control of the train is then assumed by the manual control and the relevant shift control on the screen becomes invisible.

The control may be reverted to the soft control by again clicking on the relevant reversing knob with the right-hand mouse button. The shift control then becomes visible again on the screen.

It is worthwhile noting that all settings of the soft control are transferred to the manual control and that any changes in the setting – reversing, functions, old/new format – are also transferred from the manual to the soft control.

Control of turnouts, signals and uncoupling ramps

When the left-hand button of the mouse is clicked on a turnout or signals symbol, the status of the associated turnout or signal set changes, provided that it is not part of an active secure section of track. The status of three-way turnouts or signal sets is changed by repeatedly clicking on the relevant symbol with the left-hand mouse button.

To prevent that data of intermediate conditions (in case of a Type 3 three-way user) is transferred by the program to the decoder, some time delay has been built in. Owing to this delay, the operator is able to select the correct position on the screen. During the delay time, the symbol may be repeatedly clicked on.

Since many three-way turnouts are briefly in position straight on when they are moved from the left-hand road to the right-hand road, this condition is indicated to the decoder beforehand.

A similar arrangement applies to three-way signal sets. If these are moved from ‘safe’ to ‘proceed at reduced speed’, condition ‘stop’ is briefly selected.

It is not necessary to use turnouts with switch-off since the time they are energized is variable – see options. This is not the case with uncoupling ramps: these are energized as long as the left-hand mouse button is pressed.

Secure track sections

Secure track sections are set by clicking with the left-hand mouse button first on the (start) return knob and then on the (end) return knob. Again, the start knob goes green and the end knob, yellow.

Subsidiary secure sections are set by clicking again with the left-hand mouse button on the end return knob. This then becomes the start of the subsidiary section, while the end of this section is set by clicking with the left-hand mouse button on the wanted return knob.

This arrangement allows a train to traverse a railway yard starting from a green knob. The route is via a number of yellow knobs to the yellow end stop.

ENABLING A PROGRAM

When a program or part of it has been set up, a start may be made with its execution. There is a program knob at the bottom right of the window on the screen. When the mouse is clicked on this knob, the program starts. This means that, as soon as the train passes a return knob or monitor knob that is linked to a program, program lines will be executed. Clicking on a knob always makes it go dark red. If program lines are actuated, the colour changes from light red to dark red and vice versa twice a second.

When the program is being executed, manual control remains possible. It is, however, important that the operator realizes that the software can claim an unused section of track. If the program is to be interrupted for some time, click once more on the program knob. As soon as all trains are at a standstill, the situation is stable. The screen data can then be saved and be reenabled later when the process continues from the ‘frozen’ status.

When the program is started after a knob has been actuated – the train is on a contact rail –the trigger may be carried out by clicking with the right-hand mouse button on the knob.

When a secure track section is built manually or by the program, traffic is conducted according to a fixed procedure. First, all signals on the secure section are set to ‘stop’, followed by the turnouts being set to the wanted position, and finally, the signals being set to ‘proceed’. This procedure ensures maximum safety on the section. When the train has passed the end stop of the section, the section is open to other traffic again.

A secure section can be opened manually to other traffic by clicking at the end stop with the right-hand mouse button.

Manual control of turnouts and signal sets is possible only if these are not part of a secure section of track. When the left-hand mouse button is clicked, all positions are traversed sequentially.

SETTINGS

The first choice from the menu ‘Settings’ refers to the communications port. The default setting is COM1. The menu allows an alternative, if available, to be selected.

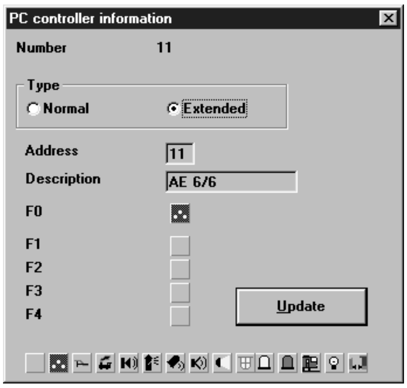
‘Actuation time’ is a second choice in this menu. This option makes it possible to set the time an electromagnet is energized between 0.2 s and 2 s.

The manual controls have fixed addresses: 2, 6, 8, 19, 24, 26, 60, and 72. If desired, each control may be given a new address. Such a new address is, however, superseded by a hard reset of the microcontroller, unless the option ‘permanent’ is selected.

If hand controls are to be disabled, they are allocated address 0.

The addresses allocated to the manual controls are saved, together with certain other properties of the screen data. When the relevant file is opened anew, the controls are programmed accordingly.

In ‘Loc decoder’ the properties of a locomotive with a super engine decoder may be laid down. This function is available only when the program is in the ‘Operational’ mode. During programming, address 79 is used. If super engine decoders are used, it is imperative to keep this address free. Also, during programming, it is essential to place only the locomotive to b e programmed on the track to prevent several locomotives being program-med simultaneously.



Number 11

Type: ○ Normal ● Extended

Address 11

Description AE 6/6

F0 ▨

F1 ☐

F2 ☐

F3 ☐

F4 ☐

The address, the maximum speed, the rate of acceleration and deceleration, the brightness of the headlights, F0, and the flash frequency of F4 of the decoder are to be set.

Finally, the desired language must be chosen from Dutch, English, French or German.

[980085-2]